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ABSTRACT

An overview is provided of progress in the development of a management information system for the California community colleges. First, background is presented on the current Uniform Statewide Reporting System (USRS), and problems with the system are identified and discussed (i.e., lack of student outcome information, unintegrated data, lack of coordinated information collection procedures, inadequate data quality, insufficient support for systems development, and lack of data access for state or local use). Next, the design principles guiding the development of a new management information system are discussed, highlighting needs for management information to promote accountability, for data integration, for an increased emphasis on data quality, for longitudinal data, and for system flexibility and access. The basic components of the system are described next, including data on students, faculty and staff, curriculum, facilities, finance, student services utilization, and district and college information. After briefly comparing the taxonomies available to afford uniform program classification, the report offers an update on the development of a feasibility study report on the costs and benefits of the proposed information system. Finally, major implementation issues are identified and plans for future development activities are discussed. An overview of the design of the state-level information system is appended. (LAL)

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ED281591

Board of Governors of the
California Community Colleges
May 28-29, 1987

MANAGEMENT INFORMATION SYSTEMS PROGRESS REPORT

9

For Information

Summary

This item presents for Board information a progress report on the development of a management information system for the California Community Colleges.

The existing information system has evolved over the past ten years in a piecemeal fashion to meet state and federal reporting requirements. The Chancellor has initiated the development of a management information system to support the research, planning, evaluation, and policy development functions of the Board, the Chancellor's Office, and local districts and colleges. This developmental activity is designed to overcome limitations within the existing system concerning data integration, data quality, student outcomes, and information access and use.

The agenda item provides background on the current information system, describes the scope of proposed reporting requirements, discusses key implementation issues, and outlines plans for future developmental activities.

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JC 870 208

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Background

The Uniform Statewide Reporting System (USRS) has developed as the community college data reporting system over a ten-year time period. The system began with the development of course activity measures and student data, with reporting on staff and categorical programs added in later years. These components of USRS were designed as independent data submissions to meet the state and federal reporting requirements in place at the time of their development. The design, funding, and implementation of this piecemeal systems development approach have led to several problems, including:

1. lack of student outcome information,
2. lack of data integration,
3. lack of coordinated information collection procedures,
4. lack of data quality,
5. lack of support for systems development, and
6. lack of data access for state or local use.

Lack of Student Outcome Information

The current student data system collects demographic information on students enrolled each term in the colleges (age, gender, ethnicity). Data are also collected on the number of units and contact hours for which the student is enrolled as of first census week (approximately one-fifth of the way through the course). There is little educational information collected, however. For example, no information is collected currently at the state level concerning course completions and grades. Other outcome information, such as certificate and degree program completions, are collected only in aggregate form and can not be tied to other student characteristic information.

The current system does not allow for the development of longitudinal student data. The system can describe, in "snapshot" form, the characteristics of students enrolled each term, but can not demonstrate the course taking patterns of individual students as they move through their community college experience. Likewise, the existing student data can not be linked with community college transfer student performance data supplied annually by the University of California and the California State University and Colleges.

As a result of these limitations, the current system can describe the characteristics of students enrolled each term, but can describe nothing about their educational program, college success, or movement among institutions. Basic questions concerning student performance thus go unanswered at the state level.

Lack of Data Integration

The current student, course, and staff reporting systems are structured as independent data submissions. There are no linkages among the systems to relate data elements from one system to any other system. This lack of integration requires that comparative data among systems be developed on an ad hoc basis using aggregated data. Such processes result in resource inefficiencies and problems with data comparability. The development of a relational data base which links elements among the various reporting structures is essential for the development of improved information.

Lack of Coordinated Information Collection Procedures

The current USRS system represents a limited amount of all data collection activities within the Chancellor's Office. Major data collection efforts which take place outside the system include fiscal reporting of budget and expenditure data, the facilities inventory, and programmatic data within categorical programs. Due to the limitations of the current USRS system, the information needs of the program units have often been developed as separate information collection processes. This has resulted in duplicate reporting requirements, the development of separate in-house data systems within the agency, and the lack of a coordinated mechanism for establishing new reporting requirements. The agency reorganization has placed the responsibility for coordinating data collection activities with the Management Information Services division.

Lack of Data Quality

Over the years, the community colleges have been criticized by the Postsecondary Education Commission, the Department of Finance, the Office of the Legislative Analyst, and others for a lack of complete, accurate, and timely data. Several factors have contributed to this problem. First, there are few sanctions against nonreporting of data. The completeness of reporting has depended to a large extent on the good will and cooperation of local districts. In the past year the completeness of reporting has improved substantially due to increased followup activities by the Chancellor's Office and the increased priority placed on reporting by local districts. Problems of accuracy and comparability are compounded by the present system's lack of historical data, differences in the manner in which the data are collected by individual institutions, and the limited use to which the data have been put for research and policy development. If the data are used simply for reporting purposes, there is little incentive for districts to devote the time and resources to improve state reporting.

Lack of Support for Systems Development

The effective use of information within the Chancellor's Office has been hampered by a lack of continued state support for systems development activities. Although limited resources have been allocated to the agency as new reporting requirements have been added, these resources have covered only the data collection, editing, and processing costs of the new systems. The development of end-user applications from the reported data have not been supported. Likewise, local district costs for new data development and reporting have not been supported by the state. Clearly districts incur costs to collect, validate, and report information to the state level. Adequate funding for these developmental costs at both the state and local level is essential for the development of an effective management information system.

Lack of Data Access for State or Local Use

Due to the resource limitations cited above, there has been little opportunity to develop ongoing mechanisms for data aggregation and reporting. This has meant that access to the information collected has been on an ad hoc basis, and has had to compete for resources with the ongoing operations and maintenance activities of the information systems unit. Consequently, responses to agency and local college staff requests for information require the time consuming and costly mechanism of writing special report programs and running those programs against the basic data. Essential to the development of a management information system is the careful construction of summary and sample data, and the provision of effective access to such data for analysts and researchers.

The Development of a Management Information System

A little more than a year ago, Chancellor Smith called for the development of a Management Information System as one of his highest priorities for the California Community Colleges. Using special one-time resources available to the agency through legislation (AB 2177, Clute) and the Chancellor's Initiative Fund, the Chancellor began a complete redesign of the information system. In addition, the Chancellor restructured the staffing and organization of the information system activities within the Chancellor's Office to provide a more central role for that activity within agency operations.

The design of a management information system was contracted through the competitive bid process to Price Waterhouse. The contract called for the development of three documents:

1. A Data Element Dictionary and Reporting Requirements;
2. A Report on Taxonomy Issues; and
3. A Feasibility Study Report.

These documents have been completed and are now in the process of undergoing field review by local districts, the Chancellor's Office, and other state agencies.

Design Principles

The development of the management information system has been guided by several design principles. These principles affect the scope, content, structure, and use of information within the proposed system.

1. Management Information Should Promote Accountability

   Much has been made over the last several years concerning the need for increased community college accountability. While there is no uniform view about what is meant by increased accountability, several points seem clear. First, accountability is not simply compliance with state and federal reporting requirements. Information reporting is a means of determining the contribution of community colleges to the citizens of California. Moreover, the communication of this contribution is made possible through an effective reporting mechanism. Second, an accountability model must have the ability to answer basic questions concerning the community colleges. What are the characteristics of the students we serve? What programs and services do we provide? What resources do we utilize? What is the result of the educational activity? Finally, student outcomes are the key measure of community college accountability. However, there is still much work to be done in defining appropriate outcome measures. Continued support at both the state and local level is a prerequisite for the development of student outcome information.

2. Need For Data Integration

   A management information system should provide the linkages and relationships among elements of student, course, staff, and resource data in order to provide a comprehensive and coordinated picture of institutional activities. This integration requires data reporting at an elemental level (individual student, course, and staff data) and the development of a uniform taxonomy for the classification of programs and activities.

3. Increased Emphasis On Data Quality

   A management information system is of little value if it can not provide accurate, consistent, and timely information for planning, research, evaluation, resource allocation, and policy development. The increased use of information for such purposes at both the state and local level will require that greater attention be provided to data edit and resolution processes.

4. Need For Longitudinal Data

There is a need to develop an historical perspective on students, programs, services, facilities, staff, and finance rather than the current term-by-term approach. The system needs to describe how the characteristics of these entities change over time. The system needs to follow community college students not simply within a single institution, but as they attend other community colleges, transfer to four-year institutions, and enter or reenter the work force.

5. Need For System Flexibility And Access

The system needs to answer changing policy questions without major data changes in the reporting requirements from districts. The system needs to limit the ad hoc data collection activities at the state level and provide a solid basis for institutional research within the community colleges. The system must be able to develop new data relationships as issues and reporting requirements change over time. The system must allow both state agency and local college access to management information in an efficient and timely fashion.

The management information system is not being designed for use only within the Chancellor's Office. It is being designed for the system of California Community Colleges. Unless this statewide information system can support the planning, evaluation, policy development, and resource allocation activities of local institutions, the system will be simply a burden to local colleges and districts.

Scope of Reporting Requirements

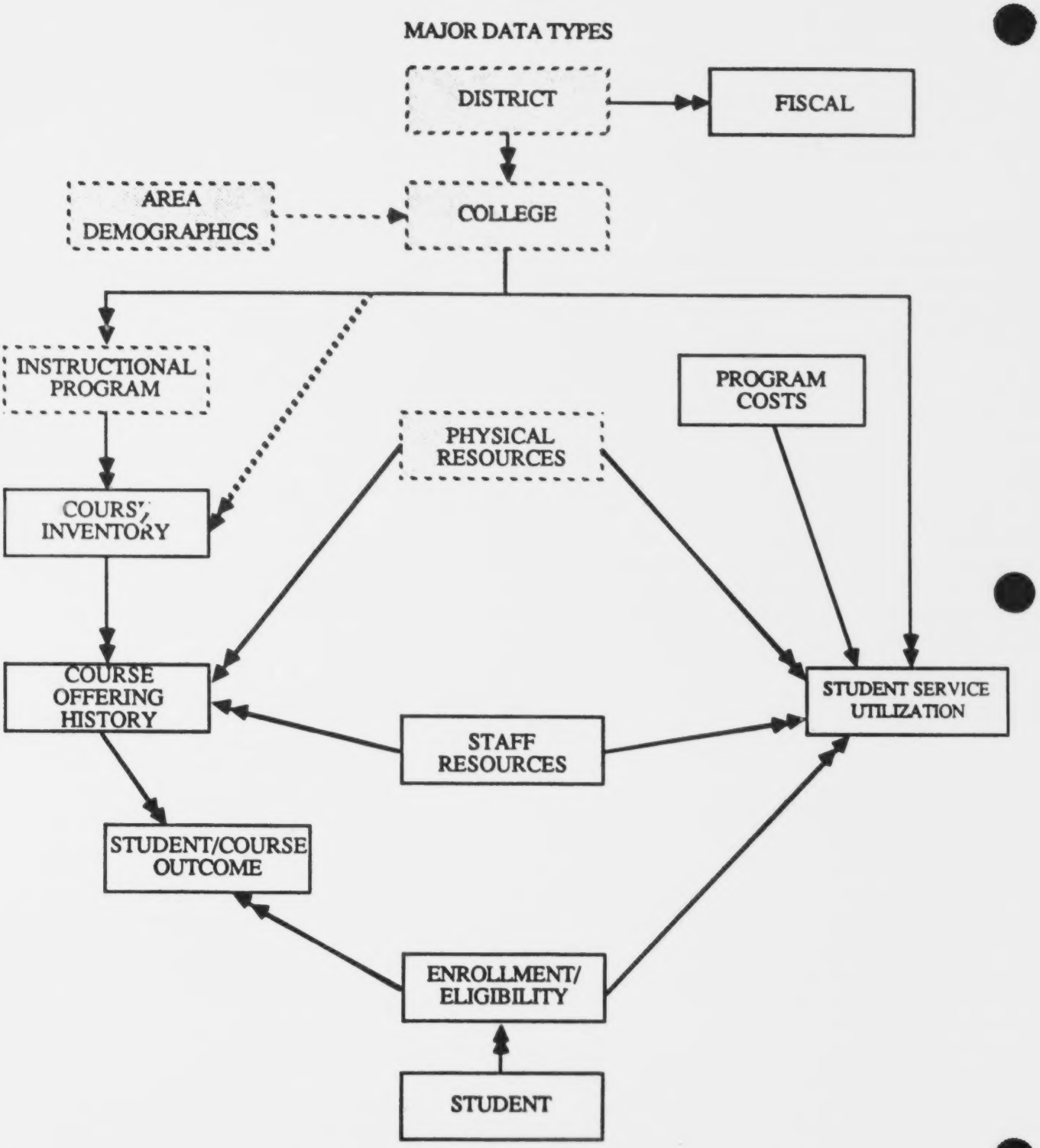
The overall scope of the information system is reflected in Figure 1. The basic components of the system represent the major entities of college operations: students, curriculum, services, staff, facilities, and finance. Each of these areas is discussed briefly below. Appendix A provides a more detailed design for each of these areas, including proposed data elements.

1. Student

Student data includes basic demographic information on students (age, gender, ethnicity), term information that varies over time (units enrolled, level, categorical program eligibility), assessment information (goal identification, assessment testing, previous education), and outcome information (course completion, grades, certificate/degree completions, transfer, employment). The current student reporting system focuses on student demographics and term

Figure I

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM



Note: Shaded Boxes Represent Data Obtained By The Chancellor Through Means Other Than District Electronic Submission.

data. The development of good student assessment and outcome information requires that the matriculation program be funded and operational.

2. Faculty and Staff

The proposed staff data collection procedures would replace the current "snap shot" approach of fall staff reporting with an annual report reflecting year-long faculty and staff assignments. This change is essential if the staff data are to be tied to course offerings and other assignment information. The proposed staff system also would tie staff to institutional positions and organization, not just a general code reflecting major area of activity

3. Curriculum

The system proposes restructuring the existing Program and Course Inventory to reflect more accurately the program and course offerings within the institutions. Rather than simply identifying the program under which an individual course was approved or added, the proposed system would relate courses to multiple certificate and degree programs as described in college catalogs and course listings. The system would continue to provide course offering history information on the scheduling of and enrollment in courses each term.

4. Facilities

The system proposes to continue the existing building and room inventory maintained within the Chancellor's Office, but to integrate the inventory with course and student data to develop facility utilization reports, to develop off-campus inventory information, and to allow the development of baseline data for the Five-Year Capital Outlay Plans.

5. Finance

The proposed structure for the reporting of budget and expenditure information is similar to the existing CCFS-311 reporting. The proposed reporting structures would allow districts to submit fiscal data in machine readable form, rather than the current hard-copy reports. The proposed system would provide for the development of instructional salary data at the 5 digit (program) level rather than the current 2 digit (discipline) level. This would be accomplished by linking course activity data with faculty salary information contained in the staff file. The system proposes that the reporting of fiscal information within the categorical programs follow the same basic structure as other fiscal reporting. Categorical data would be reported at the college level, as is done currently. Federal reporting requirements call for income and expenditure data to be reported at the college level as well. In the information system is to

meet the federal reporting requirements, some income and expenditure data would have to be reported at the college level.

6. Student Services Utilization

The student services area of reporting represents a major new reporting requirement within the information systems project. While the Chancellor's Office has collected unitary data on students and courses, student services information has been reported only in aggregate form. This limitation has required the ad hoc collection of additional information to meet specific policy questions raised by the Legislature, Postsecondary Education Commission, Department of Finance, or other agencies. Like the student/course match on the instructional side, the system proposes to match student services activities (counseling, assessment, financial aid) to the set of students receiving those services. This reporting would allow for the development of uniform student services workload information.

7. District/College Information

The system design proposes to incorporate additional demographic information concerning district and college service areas. This would be accomplished by mapping census tract and zip code areas to district boundaries and to college primary service areas. The system also calls for the development of additional information concerning district and college organization to reflect the diversity of local operations more accurately.

Taxonomy Review

The uniform classification of the entities described above is essential if the information system is to provide comparable data among colleges. Taxonomies attempt to structure the classification process based on the identification of common elements. Currently, the community colleges in California use the Taxonomy Of Programs (TOP) to classify instructional programs and courses, and the Classification of Support Services (CSS) to classify noninstructional activities. The TOP/CSS structure is incorporated in the Budget and Accounting Manual (BAM) to reflect the expenditure of funds by activity. In addition, the California Postsecondary Education Commission and the federal government require the reporting of educational program and staffing data by the federal Classification of Instructional Programs (CIP).

The CIP taxonomy has the advantage of being a federally maintained taxonomy, which promotes interstate comparison of information. The CIP taxonomy is also required for federal reporting purposes and is used by the Postsecondary Education Commission to collect comparable data for California's postsecondary institutions. The CIP taxonomy also provides a wider array of program areas than the TOP. The

TOP structure, however, was designed specifically for California's community colleges. As such, it is a "known" entity and is currently being used within colleges. Although there are several areas of the TOP coding structures which could be improved, continued use of TOP could save local district conversion costs and maintain historical data continuity.

In the support services area, the existing CSS structures provide a high level of data aggregation. Student service functions, for example, are classified into three major areas: counseling and guidance, admissions and records, and other student services. Student service deans, however, have developed a detailed taxonomy of services which identify more than 200 activities. Defining the appropriate level of detail for data reporting in this and other support functions is an essential step in the development of reporting requirements.

Feasibility Study Report

The Feasibility Study Report (FSR) presents a cost/benefit analysis of proposed changes in information systems activities within state operations. The Chancellor's Office is required to submit an FSR for any data processing project over $25,000. The FSR is submitted to the Office of Information Technology (OIT) and the Budgets Division, both within the Department of Finance. In addition, a copy of the FSR is submitted to the Office of the Legislative Analyst. The FSR must be reviewed and approved by these agencies before funding is secured in the budget process. Thus, the FSR is the key document for future funding of the management information system.

Last October, the Chancellor submitted the Management Information System FSR to the state control agencies. The FSR identified the proposed restructuring of the information system, identified a 3 to 5 year phase-in plan for the system, and recommended the acquisition of a single in-house system to replace the existing five office automation systems within the Chancellor's Office. The FSR identified a projected cost for the information system of $16 million over a four year period. Of this amount, $13 million was identified for local district implementation of the revised reporting requirements and $3 million was identified for staffing, systems development, and equipment procurement within state operations.

A Budget Change Proposal (BCP) of $6 million was submitted for the 1987-88 Governor's Budget to fund the first year implementation costs of the new system. Although this funding was not included in the Governor's Budget, the Governor and Department of Finance agreed to keep the funding issue open for a possible May Revision to the Budget. Subsequently, the FSR was rejected by Department of Finance due to concern over the adequacy of the problem statement, local district implementation cost estimates, the development of an in-house system, and implementation schedules. The evaluation suggested that the systems development and implementation be done at the Teale Data Center and that the development

proceed on a limited pilot project basis. After discussions with Finance staff, the FSR was restructured to incorporate a number of Finance recommendations and was resubmitted in late April. A decision concerning the FSR and budget funding will be made by the Department of Finance during May.

Major Implementation Issues

The proposed management information system design is extensive and complex. The implementation of the system is not, however, constrained primarily by technical issues, but rather by resource and policy issues. Major implementation issues are identified below, along with a brief description of the issues involved.

- Resources must be acquired to fund the state and local implementation costs for the proposed system. The Chancellor has made a commitment to local districts not to implement new reporting requirements unless adequate funding is provided for the activity. The project must be phased in over a three to five year period, allowing local districts sufficient lead time for the development of new data collection and reporting procedures.

- Decisions need to be made on the taxonomy structure(s) to be used, the level of detail to be used within the data reporting, and how student services activities are to be identified within the taxonomy.

- Agreement must be reached concerning expectations for the system. What are the purposes and uses of information to be collected and developed? What will the role of the Legislature, Governor, Board of Governors, local districts, and other state agencies be in the determination of the uses of the information? At what level of analysis will reports be developed: systemwide, district, campus?

- Procedures need to be developed to insure the coordination and review of new reporting requirements and to promote stability in reporting. Measures must be established to insure complete and accurate reporting and to provide access and use of data once reported.

Next Steps

Field Review of Draft Documents

Draft documents concerning reporting requirements, data element definitions, and taxonomy issues have been distributed for field review. This initial review will take place during April-July, with local district responses requested by July 31. During the August-September timeframe, the Chancellor's Office will review district responses and make revisions to the draft documents. Priorities for future applications development will be established. Policy implications of the project will

be reviewed through the consultation process. A Board of Governors item will be developed to review proposed 1988-89 reporting requirements.

Relation to Other Projects

The information systems project is designed to support the activities of the Board of Governors, Chancellor's Office, and local districts and colleges. To the extent possible the systems design effort has attempted to identify reporting requirements for a number of developmental activities, including:

- Matriculation
- Academic Standards/Course Prerequisites
- Student Outcomes
- Alternative Funding Mechanism
- Accountability Reports
- Vocational Education Followup
- Student Performance Reports
- Project Assist
- Fiscal Stability/Going Concern
- Comprehensive Planning
- Statewide Objectives.

The exact nature of the requirements for these activities will not be known until the systems are implemented and tested, which will require the continued monitoring of these projects in relation to information systems development activities.

Historical Profiles Project

Work will continue on the development of historical data funded by AB 2177 (Clute). The Student Profile Report is mailed with this agenda. This document, describing student enrollment trends over the past ten years, is the first of several reports. Future reports will include course, staff, and finance profiles. In addition to the reports, summary data files are being prepared for distribution to local colleges, districts, and other state agencies.

APPENDIX A

DESIGN OVERVIEW

Purpose

The Chancellor's State-Level Information System has been designed to meet a variety of information needs identified by the Chancellor's Office. The identification process has taken into account both past experience, current, and anticipated needs (e.g., differential funding and matriculation). The use of the information in the data base will be focused on issue identification, policy analysis, program evaluation, and planning, not compliance or support of administrative operations at any level.

Design Objectives

Five basic design objectives underly the Chancellor's data base.

- **Accountability** implies the ability to respond to basic questions about the students being served, their demographic characteristics, the courses and services that they are utilizing, their goals, and the outcomes they achieve through the community college system. It also implies the ability to respond to basic questions about how and where resources (staff, faculty, facilities, and dollars) are applied to serve the students and communities that support the colleges.

- **Integration of data** implies that ability to link together related data elements to serve the basic questions discussed above. For example, it should be possible to relate basic student demographic data to course activity data to answer questions about the race and gender of the unduplicated headcount of students enrolled in various occupational programs.

- **Quality of data** implies the ability to provide accurate and consistent information on a timely basis. Accuracy and consistency require editing and comparison of data in order to eliminate unreasonable information. For example, information about the courses faculty are teaching should match information about the courses students are taking.

- **Longitudinal tracking** implies the ability to follow over time the progress of students in meeting their goals, institutional performance, and needs. Policy makers want the ability to measure the success of new initiatives (e.g., matriculation) in achieving improved student performance (e.g., transfer or completion rates). Such measurements require the ability to follow the performance of discrete units over time.

- **Flexibility** implies the ability to perform a variety of ad hoc analyses using a stable base of data. Emerging issues or changing circumstances should not necessarily be grounds for new data requirements being placed upon the districts.

Major Categories of Information

The information system is designed to collect and organize information from five major areas of activity:

- Students;
- Faculty and staff;
- Programs and courses;
- Facilities; and
- Financial activity.

The Chancellor seeks to collect that information that is required to answer fundamental questions related to each of the five areas listed above. It would be impossible to list every possible question related to the five areas. It is more useful to review the data elements documented in the Dictionary. A review of the Dictionary will reveal the basic nature of the information required for each of the five categories listed above. The use of common linking data elements (Social Security number, CIP and BAM codes, district and college number, etc.) and the use of data base software will allow data to be linked from the various categories in order to respond to a variety of questions.

Figure I

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM

DISTRICT AND COLLEGES DATA

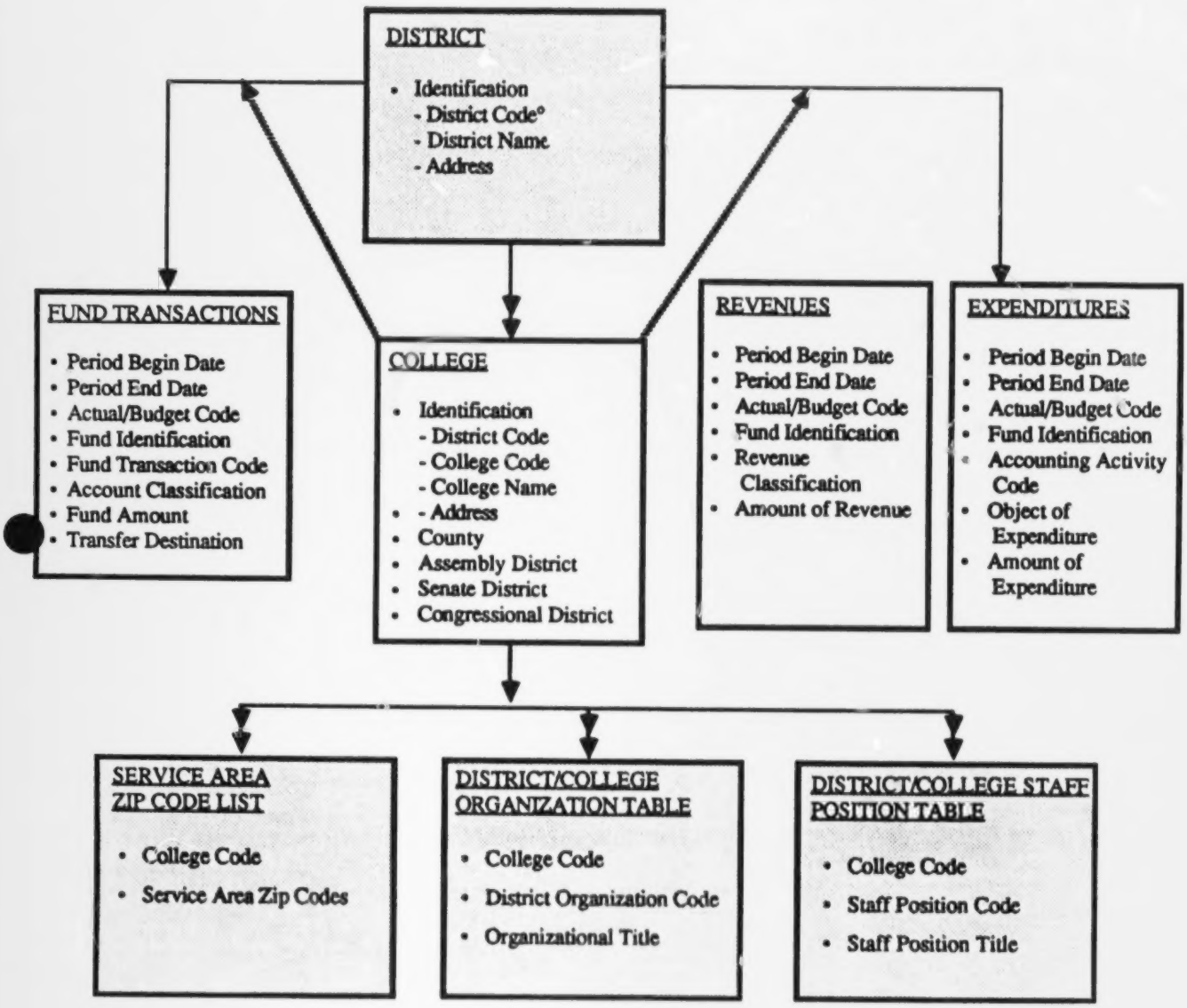


Figure II

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM
INSTRUCTIONAL PROGRAM AND COURSE DATA

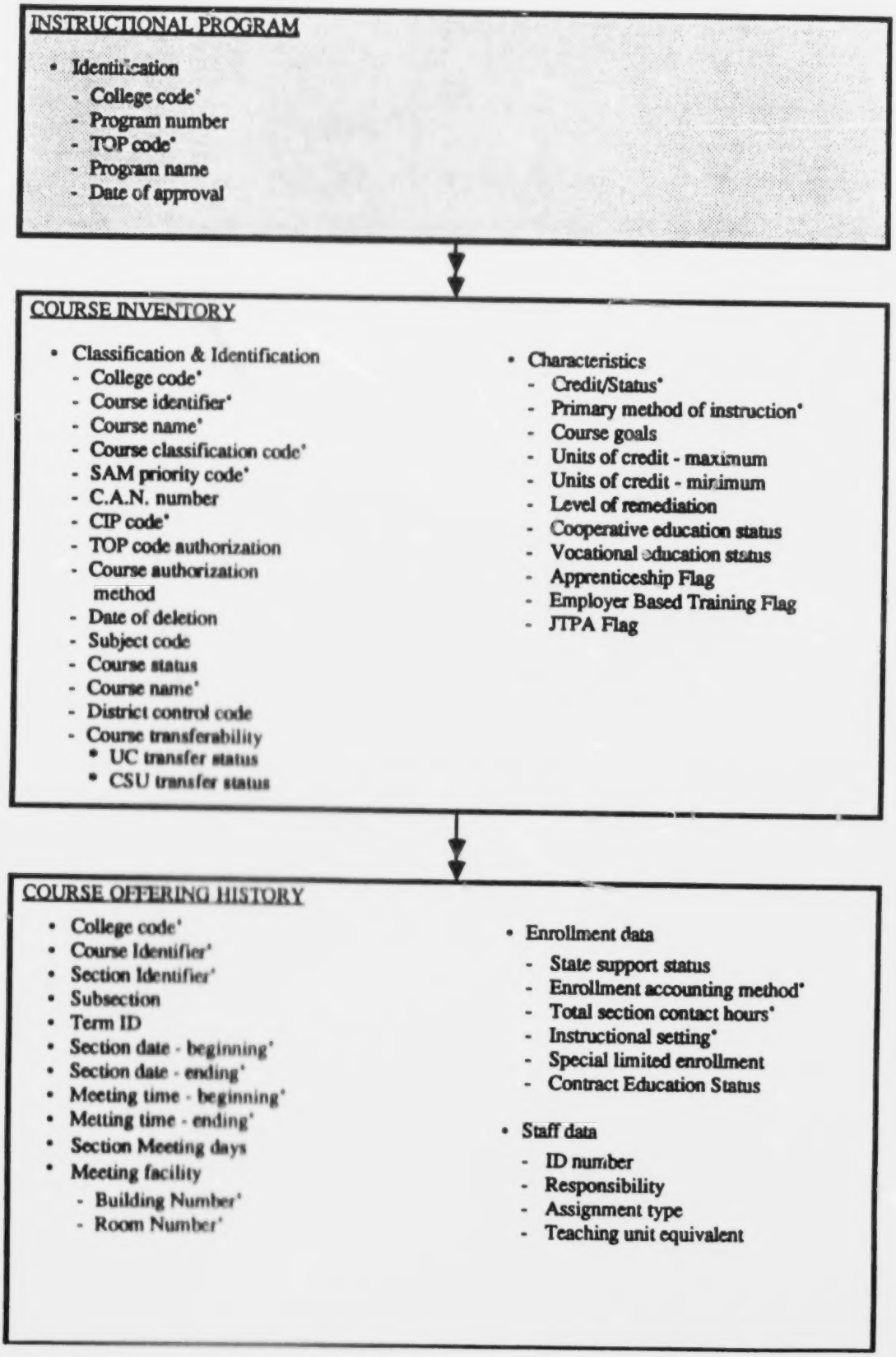


Figure III

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM
STUDENT SERVICES DATA

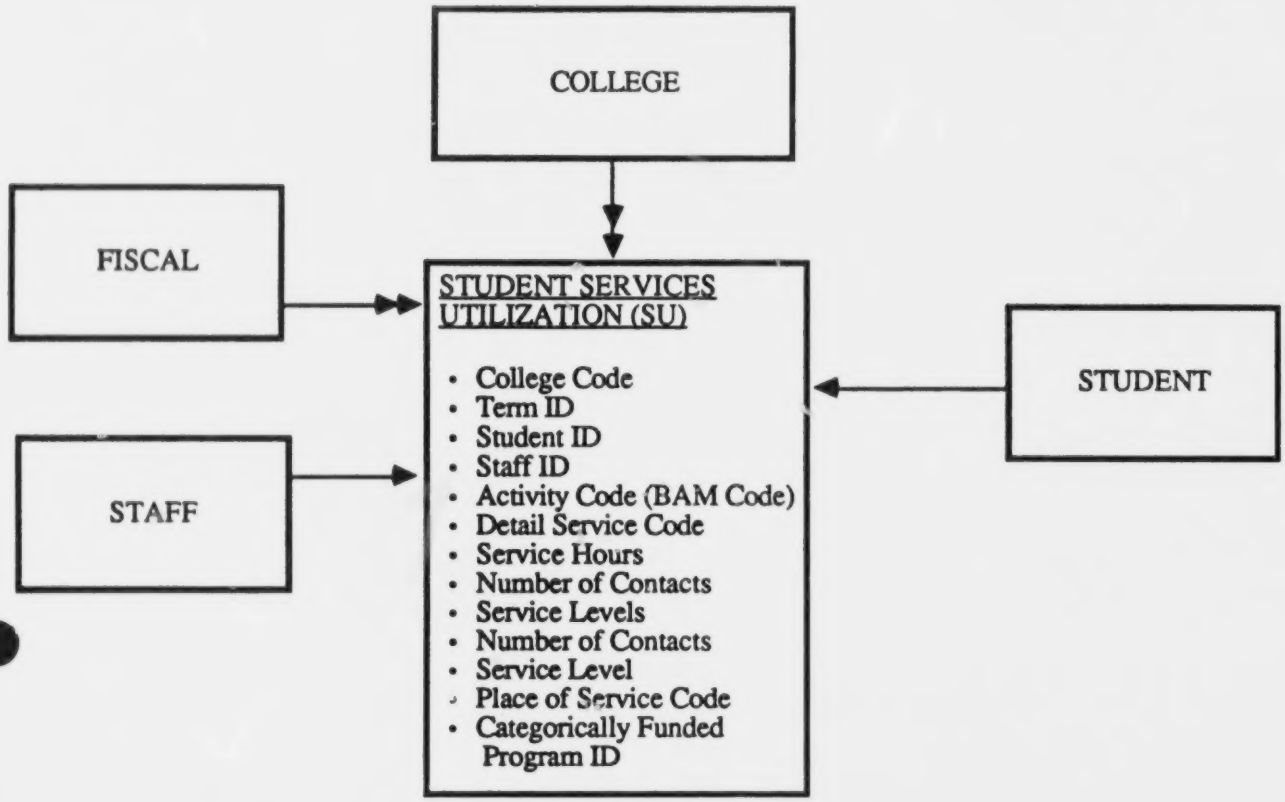


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Figure IV

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM

STUDENT DATA #2

PERMANENT DEMOGRAPHICS

- Social Security Number
- Birth Date
- Gender
- Racial/Ethnic Code

ENROLLMENT/ELIGIBILITY (TERM DATA)

- Key Identification
  - Term ID
  - College Code
  - Social Security #
- Student Demographis (SD)
  - Citizenship Code
  - Residence Code
  - Residence Zip Code
  - Enrollment Status
  - Academic Standing - End of Term
  - Apprenticeship Indicator
  - Hours worked per week
  - Work study hours worked
- Student Goals (SG)
  - Academic Goals
  - Vocational Goals
  - Personal Development Goals
  - Primary Goals
  - Major or Area of Emphasis
- Prior Education (SE)
  - Prior education
  - High School Education
  - High School Last Attended
  - College of Last Attendance
- Student Assessment (SA)
  - Assessment Instrument
  - Assessment Date
  - Raw Score Result
  - Named Percentile
- Matriculation Status (SM)
  - Matriculation Component
  - Matriculation Status
  - Services Desired
- Program Completions (SP)
  - Degree/Certificate Received
  - Degree/Certificate Area of Emphasis
  - Completion Date
- Financial Aid (PF)
  - Dependency Status
  - Budget Category
  - Budget Period
  - Budget Amount
  - Adjusted Gross Income - Parent
  - Adjusted Gross Income - Student & Spouse
  - Untaxed Income - Parent
  - Untaxed Income - Student & Spouse
  - Family Members - Parent
  - Family Members - Student & Spouse
  - Family Income
  - Self Helf Expectation
  - Parent Contribution
  - Pell Grant Index
  - Veteran's Benefit Status
- Financial Aid Received (PA)
  - Type/soruce
  - Amount
- DSDS Participants (PD)
  - Disability Classification
  - Disability - age at onset
  - Department of Rehab. Client
- Voc Ed. Participants (PV)
  - Adademically Disadvantaged
  - Economically Disadvantaged
  - Limited English Proficiency
  - Sam Completion Status
  - Supplemental Vocational Education Disbaility
- EOPS Participants (PE)
- Transfer Center Participants (PT)

STUDENT/COURSE/OUTCOME

- Course Outcome (SO)
  - Grade Outcome of Course
  - Units of credit
  - Active Enrollment Date
  - Drop DAte
  - Positive Attendance Hours
  - Apprenticeship hours
  - Coop Prog-Employer Classification
  - College Code
  - Course Identifier
  - Section Identifier
  - Term ID

Figure V

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM

FACILITY DATA

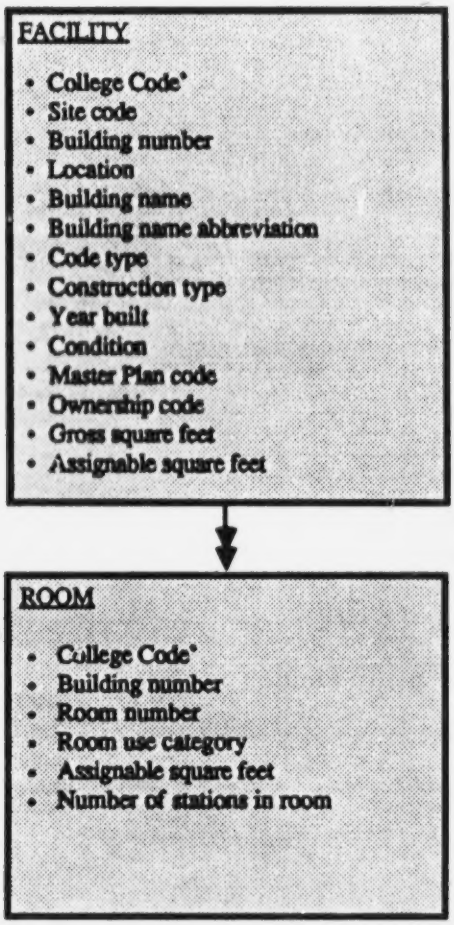

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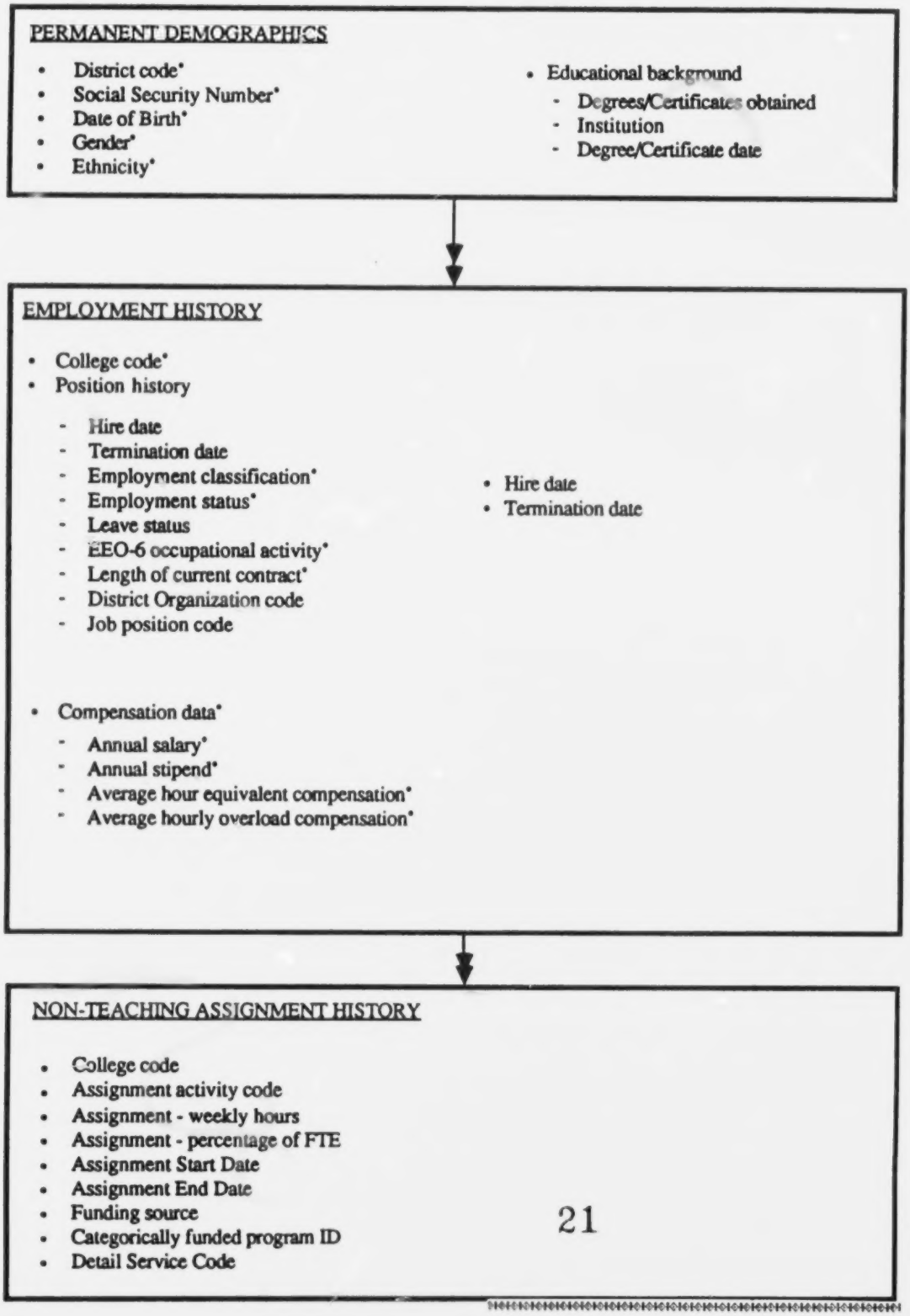
Figure VI

CONCEPTUAL DESIGN: CHANCELLOR'S STATE LEVEL MANAGEMENT INFORMATION SYSTEM

STAFF DATA



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